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# A COMPARISON OF NURSE PRACTITIONERS VERSUS PHYSICIANS IN MANAGING AMBULATORY INFECTIOUS DISEASES OF CHILDREN (AGES 1 TO 5) IN PRIMARY CARE

BY

JENNIFER ANN KNOPP

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of MASTER OF NURSING.

FACULTY OF NURSING

Edmonton, Alberta

Spring 2001

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DEGREE: Master of Nursing

YEAR THIS DEGREE GRANTED: 2001

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled A COMPARISON OF NURSE PRACTITIONERS VERSUS PHYSICIANS IN MANAGING AMBULATORY INFECTIOUS DISEASES OF CHILDREN (AGES 1 TO 5) IN PRIMARY CARE submitted by Jennifer Knopp in partial fulfillment of the requirements for the degree of Master of Nursing.

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**Abstract**

In the changing arena of health care, advanced practice nurses must ensure their positions in evolving marketplaces by evaluating the quality and outcomes of care. The purpose of this comparative study was to investigate nurse practitioners (NP) versus primary care physicians (PCP) in the management of infectious diseases in children (ages 1 to 5). A retrospective chart review was conducted on all consecutive children (ages 1 to 5) who presented with infectious diseases, and were seen by a NP or PCP, at the Pelican Narrows Nursing Station, Saskatchewan from January 1 to June 30, 2000 ($\underline{n} = 985$). There were significant differences between NPs and PCPs in the class of antibiotic prescribed ($\chi 2 = 43.8$ [7, $\underline{N} = 985$], $\underline{p} = 0.00$), the type and frequency of antibiotics recommended per diagnosis ($\chi 2 = 739.5$ [77, $\underline{N} = 985$], $\underline{p} = 0.00$), and the frequency of follow-up suggested ($\chi 2 = 40.2$ [1, $\underline{N} = 985$], $\underline{p} = 0.00$). There were no significant differences found in the age, gender, and diagnoses of children seen, or the diagnostic tests ordered by health care provider. These findings are consistent with existing research and thus, support claims of NP competence when compared with physicians.

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# CHAPTER ONE

## Introduction

As the largest group of health care providers, nurses are essential to the delivery of services at all levels of the health care system. Historically, nursing has been responsive to changes and influential in shaping the continually developing health care system (Castledine, 1995; Dougherty & Sheets Cook, 1994). In recent years, the debate surrounding the issue of nurses developing new and different roles and expanding the care they provide has gained momentum (Totten, Lenz, & Mundinger, 1997). Advances in knowledge and technology have led to multiple specialties and subspecialties, and nurses by virtue of their education, experience, and numbers, are well positioned to provide growing services in a restructured, wellness-focused system (Fitzgerald & Wood, 1997; Ford, 1997). Advanced practice nursing (APN) roles are evolving to address the holistic health care needs of individuals, families, and communities. Existing research has shown that nurses prepared at the advanced level are in a unique position to provide comprehensive care at a cost the health care system can afford (Canadian Nurses Association [CNA], 1997). Findings from studies conducted over the past three decades suggested that the quality of care delivered by nurse practitioners and physicians in primary care is of equal

caliber. The results of these studies are described in an article published in The New England Journal of Medicine (1994) stating:

> When measures of diagnostic certainty, management competence, or comprehensiveness, quality, and cost are used, virtually every study indicates that the primary care provided by nurse practitioners is equivalent or superior to that provided by physicians. (p. 211)

Mundinger (1994) noted that APNs are effective patient care managers, and when compared with physicians, are more likely to provide disease prevention counseling, health education, and health promotion activities, as well as utilizing various community resource programs. As a result, APNs are now more frequently considered for positions that were once filled by physicians (Tedford, 1991).

However, as APNs continue to define their niche in the primary care environment, questions continue to be raised regarding their effectiveness and appropriate scope of practice. Several non-physician health provider groups have purported that up to 90% of primary care can be delegated to APNs. It was suggested that efforts be made to convince governments and the public that patient access to primary care be reoriented, away from physicians and toward alternative services (Canadian Medical Association [CMA], 1995). Physician groups continue to argue that more methodologically rigorous studies focusing on both the process and outcome

of clinical care are needed. Furthermore, there are no current published Canadian studies. Therefore, comparing the diagnostic and prescriptive behaviors of APNs and PCPs by way of a clinical chart review will provide further valuable information. The findings of this study will not be used to suggest that APNs and physicians are interchangeable, nor will cost effectiveness or long term outcomes of nurse practitioner (NP) care be addressed. The findings, however, will add to the ongoing evidence regarding the roles of different providers in the health care system for health policy formulation.

## Purpose of the Study

The purpose of this study was to compare NPs with PCPs in the diagnosis and treatment of infectious diseases in children (ages 1 to 5) in a remote setting in northern Saskatchewan. Otitis media (OM), upper respiratory tract infection (URTI), gastroenteritis (GE), and skin and soft tissue infections present among the most common conditions in pediatric or family practice, and are endemic to most isolated, northern communities in Canada (Dowell & Schwartz, 1998; Gantz, Kaye, & Weart, 1995; Health Canada, 1997). The most current needs assessment for the community of Pelican Narrows (1991) indicated infectious conditions are the most common reason for clinic visits in the preschool population. Rates of antimicrobial drug use are subsequently the highest in children; therefore, the pediatric age

group was chosen for this study (Bisno, Gerber, Gwaltney, Kaplan, & Schwartz, 1997).

The research questions addressed were:

1. Is there a difference in the numbers of children with infectious diseases (ages 1 to 5) seen by a NP or PCP?
2. Is there a difference in the diagnosis of children with infectious diseases (ages 1 to 5) seen by a NP or PCP?
3. Is there a difference in the diagnostic tests ordered by a NP or PCP in the management of children (ages 1 to 5) with infectious diseases?
4. Is there a difference in the antibiotic treatments prescribed by a NP or PCP in the management of children (ages 1 to 5) with infectious diseases?
5. Is there a difference in the follow-up suggested by a NP or PCP in the management of children (ages 1 to 5) with infectious diseases?
6. Is there a difference between NPs and PCPs in adherence to the Canadian Medical Association (CMA) accepted practice guidelines for the management of children (ages 1 to 5) with infectious diseases?

## Significance of the Study

Reliable and valid information on NP behavior is required for measuring the adequacy of NP performance. The findings of this research add to the empirical evidence related to the role, process of care, and outcome

of primary care provided by the NP. One of the past criticisms of the NP literature was that physician care was the standard to which nursing care had been compared (Brown & Grimes, 1995). This study not only compared NP practice with that of PCPs, but also compares both practitioners to the practice guidelines accepted by the CMA (Gilbert, Moellering, & Sande, 2000). Potential use of the findings of this research on a broader scope may provide insight for health policy makers when determining the appropriate providers of primary health care. More locally, this research will provide the host agency, Pelican Narrows, with a comprehensive audit of the current process of care.

# CHAPTER TWO

## Literature Review

A literature search of CINAHL and MEDLINE, from 1965 to present, was conducted using the following key terms: advanced practice nursing (APN), nurse practitioners (NPs), physicians, primary care, comparison, evaluation, outcome, scope of practice, effectiveness, differences, and role history. The Canadian Nurses Association (CNA), Alberta Association of Registered Nurses (AARN) and the CMA were each contacted to obtain additional reports, position statements, and bibliographies. Bibliographies were used as a resource for relevant articles, and the tables of contents of the recent nursing and relevant medical journals were scanned for the most recent studies. The review revealed that there is a lack of scientific empirical data comparing physicians and nurse practitioners. The literature available is predominantly anecdotal and American. There were no current published articles found on similar studies done in Canada. In fact only one study using retrospective chart audit, the design of this research study, was found.

### Definition of APN

APN refers to a master's prepared registered nurse working within a specialty area where superior clinical skills, decision-making, and judgement are acquired through a combination of experience and education (Carroll & Vaunette, 1997). The APN integrates research based theory with expert

nursing in a clinical specialty, and combines the roles of practitioner, teacher, consultant, and researcher (CNA, 1997). Having experience in a specialty with no further education, an 'expert by experience', is not on its own sufficient to be deemed an APN (CNA, 1997; Kelly, 1996). APN is practice, based on the knowledge and skills acquired in basic nursing education, and built on in specialty certification, and graduate education.

APN, a broad conceptual term, describes nurses who work in a specialized area of practice with a defined population across a broad spectrum of practice settings (Patterson & Haddad, 1992). Most common are the roles of nurse practitioner (NP), clinical nurse educator (CNE), certified nurse midwife (CNM), clinical nurse specialist (CNS), and certified nurse anesthetist (CNA) (Berger et al., 1996; Norsen et al., 1996; Mundinger, 1994). Although all of these roles are considered under the umbrella of APN, there may exist many differences in role functions (scope of practice) largely due to the needs of the setting in which they are employed (Patterson & Haddad, 1992).

The scope of APN includes a broad spectrum of interventions with patients / clients including: health assessment; risk appraisal; health education and counseling; diagnosis and management of acute minor illnesses and injuries (AARN, 1995). APNs are accountable for the knowledge, skills, and attitudes necessary to collaboratively (with physicians), and sometimes

independently, provide a full range of comprehensive health care services to the public. These nurses must meet this obligation to the public for the provision of safe, competent, ethical care through their professional regulatory association (AARN, 1995).

**Historical View of APN**

The role of the APN, through educational programs for NPs, was initiated in Canada more than 25 years ago. The shortage of physicians to provide primary care particularly in rural under-serviced areas was the impetus for development of the role in the 1970's (Dunn & Nicklin, 1995). Historically nurses have frequently provided extended health services to the public in a variety of settings and circumstances. Initially the APN was conceived as a physician replacement role for populations who would have otherwise remained under-served (Brown & Grimes, 1995). Traditionally, as the first and primary contact to the health care system for people in principally isolated northern communities, nurses provided a broad spectrum of services: from emergency care, to treating common health problems and chronic illnesses, to designing and delivering health promotion activities (Brumwell & Janes, 1994). Although the nurse typically worked in isolation, there was close collaboration with a physician who was designated available for consultation and referral (Porter-O'Grady, 1997).

For a variety of reasons, namely the oversupply of physicians in urban areas, NP programs in Canada were discontinued in 1983 (Dunn & Nicklin, 1995). There is a noticeable decrease in published articles and research studies between the 1980s to the 1990s, after which a renewed interest occurred, in part, due to the response to economic cutbacks and subsequent health care reform. In 1980, the role of the CNS started to emerge in acute care hospitals (Dunn & Nicklin, 1995). Literature and practice depicted the CNS as having both direct and indirect functions in the provision of in-patient care (McFadden & Miller, 1994). They typically work in acute care hospitals in the role of expert practitioner providing care to patients with complex health problems, as consultant, educator, and researcher (Haddad, 1992). Through consultation and staff education, CNSs affect patient care indirectly by their influence on the clinical practice of other nurses (McCaffrey Boyle, 1996). However, the roles of the CNS and the NP in primary care were both envisioned as a means of bringing clinical expertise to defined populations, their focus of expert care was different. For many years, the differences in these two roles were considered strengths and each existed separately and successfully within their specific practice domains: the CNS with a specialty patient group and the NP as a direct patient care provider in the community with a focus on primary health care services and health promotion (Norsen et al., 1996).

Recently, the boundaries distinguishing the roles of CNS and NP have become blurred. The high cost of delivering health care has prompted hospitals to reorganize and prioritize institutional goals (Kelly, 1996). In the 1990s, with increases in patient acuity and complexity, the impact of resident cutbacks on medical coverage, and the desire to improve continuity of care, were all driving forces that fostered additional development of advanced practice roles in tertiary care settings (Haddad, 1992). These factors, combined with the anticipated reduction in the availability of resident medical staff, have supported the emergence of the ACNP (Berger et al., 1996). This new clinician "combines the advanced skills of the primary health care NP with the leadership, research, education, and systems expertise of the CNS" (Norsen et al., 1996, p. 152).

**Models of NP Practice**

Traditionally, the NP's scope of practice has been described as a replacement model for physicians' services, and was envisioned as a collaborative and collegial relationship (Ford, 1997; Mitchell et al., 1993). The scope of practice can be placed along a continuum of activities from those traditionally within the medical domain to solely nursing functions. Along this continuum, NPs may engage in collaborative or independent functions. "While some may make much of the distinction between independent and collaborative practice, few PCPs are truly independent of

other colleagues. Most consult frequently" (Sox, 2000, p. 107). Seeking advice is a professional norm of health care practice. Weiss and Davis (1985) defined collaborative practice as interactions between NPs and physicians that enable the knowledge and skills of both professions to influence the patient care being provided. Independent practice means that the nurse is not subject to another's authority or decisions. While NPs have been able to successfully practice independently, the complexity of certain situations has required the collaborative efforts of a multidisciplinary approach (Mitchell et al., 1993). Even in the United States independent practice is rare.

The model most often identified in the literature is that of collaborative practice, where NPs bear the principal responsibility for the diagnosis and management of uncomplicated illness using physicians as consultants and referral sources (Mundinger, 1994). In collaborative practice, the two professionals share authority equally for providing care within the scope of their practice. It is the professional responsibility of each practitioner to identify those situations requiring consultation and to coordinate the care appropriately. Mundinger (1994) described these responsibilities suggesting that the NP is not always required to obtain the physician's approval to provide such patient care.

> When there are differences of opinion, the person with the greatest degree of professional competence holds authority; for complex diagnostic and treatment problems involving unstable and critically ill patients, this is the physician, and for prevention, access to community-based resources, health education, and counseling, it is the NP. When there is a difference of opinion about a patient's direct medical care, the physician has final authority. (p. 211)

**Evaluation of NPs in Primary Care**

A variety of studies have been conducted exploring the effectiveness and outcomes of care provided by NPs in primary care. The first study comparing the practice of primary care providers in Canadian history found considerable evidence that NPs can provide a substantial share of primary care as safely as physicians, and that they do so without a decrease in the quality of care or outcomes (Spitzer et al., 1974). In this study, dubbed the Burlington Randomized Trial of NPs, 1600 families were assigned randomly to care by a traditional family practice group or a NP group in consultation with physicians. The study compared health status and quality of care of each group, as well as patient satisfaction. No difference was found in physical status, functional capacity, or social function between the groups. Since then, many well-designed studies have been conducted with virtually the same findings. When measures of diagnostic certainty, management

competence, or comprehensiveness, quality, and cost of care are used, virtually every study reviewed indicated that the care provided by APNs is equivalent or superior to that provided by physicians (Brown & Grimes, 1993; Lomas & Stoddart, 1985; Nichols, 1992). The justification for NPs in primary care settings is well documented (Castledine, 1995; Caroll & Vaunette, 1997; Dougherty & Sheets Cook, 1994). The safety, cost-effectiveness, and high quality comprehensive care provided by NPs is well-established (Shay, Goldstein, Matthews, Trail, & Edmunds, 1996). Three major reviews conducted on the effectiveness of NPs in primary care included a study by the Office of Technology Assessment (OTA) in 1986, an information synthesis conducted by Crosby, Ventura, and Feldman in 1987, and a meta-analysis conducted by Brown and Grimes in 1995 (Brown & Grimes, 1995; Crosby, Ventura, & Feldman, 1987; U.S. Congress, OTA, 1986).

The OTA (1986) conducted a study that reviewed the outcomes of NPs, physician assistants (PAs), and CNMs practicing in primary care settings. This integrative review analyzed 14 studies examining how the use of non-physician providers affected quality of care, access to care, the productivity of providers, and the costs of care, compared with physicians. Visits were timed, and an analysis of cost of salary, office space, follow-up visits, ancillary services, and medications ordered was performed. This study

concluded that the overall quality of care provided by NPs, PAs, and CNMs was equivalent to that provided by physicians. Specifically, NPs, PAs, and CNMs were found to be comparable with physicians in performing physical assessments and prescribing drugs, degree of patient compliance, and in their ability to resolve acute patient problems, reduce pain or discomfort in pediatric patients, and improve patients' physical, emotional, and functional status. They were also shown to be better at reducing the number of patient symptoms, including greater degree of blood pressure control in hypertensive patients, greater degree of weight reduction in obese patients, greater reduction of pain and discomfort in adult patients, and lower level of activity limitations and anxiety in patients with chronic problems. Moreover, NPs, PAs, and CNMs increased access to primary care for populations inadequately served by physicians, and when working under a physician's supervision increased total practice output by 20% to 50% (US Congress, OTA, 1986).

Crosby et al. (1987) also conducted an extensive synthesis of literature that examined NP effectiveness. After an extensive computerized and manual search of the literature, 248 documents judged to be relevant to the topic were reviewed by a content expert panel ($n = 11$), and a methodology expert panel ($n = 8$). Four areas of effectiveness were examined including utilization, delivery of care, short-term outcomes and long-term

outcomes. This study reported findings consistent with those of the OTA (1986) study. Crosby et al. (1987), as did Hall et al. (1990) and Ramsay, Mckenzie, and Fish (1982), found that: (1) patients are satisfied with the care provided by NPs; (2) the interpersonal skills of NPs are better than those of physicians; (3) the technical quality of NP services is equivalent to that of physician services; (4) NP patient outcomes are equivalent or superior to physician patient outcomes; and (5) NPs facilitate continuity of patient care and improved access to care in rural and other settings, and provide care to underserved populations. These researchers concluded that NPs performed a comprehensive range of activities that included extended health services and had a positive influence on short-term patient outcomes. Long-term outcomes were only assessed in 14% of the studies reviewed; therefore, no conclusions were drawn (Crosby et al., 1987).

The American Nurses Association (ANA) funded a meta-analysis (Brown & Grimes, 1996) which focused on process of care, clinical outcomes, and cost-effectiveness of nurses in a primary care role, compared with physician care. This study was an evaluation of patient outcomes of NPs and CNMs, compared with those of physicians in primary care. The findings were consistent with previous research that documented the effectiveness of care provided by the NP (Crosby et al., 1987; U.S. Congress OTA, 1986; Mitchell, Pinelli, Patterson, & Southwell, 1993). Specifically they found that

NPs provided more health promotion activities than did physicians and scored higher on quality of care measures. The sample included 38 NP and 15 CNM studies, in which 33 outcomes were analyzed using physician care as the standard for comparison. This meta-analysis included only the most scientifically rigorous studies available. When Brown and Grimes restricted the analyses even further to the randomized controlled trials (RCTs), results either did not change or produced more favorable results for the NP group (1996). As a result of this meta-analysis, the ANA recommended the continued and expanded use of NPs as providers of primary care.

Three studies by Hall et al. (1990), Salkever, Skinner, and Steinbach (1982), and Avorn, Everitt, and Baker (1991), all non-nurse researchers, compared NP and PCP practice, and found NPs to be the superior practitioner. Hall et al. (1990) set up audit criteria, with input from the practitioners involved, and audited charts of 426 physicians and NPs in 16 ambulatory care practices. They looked at eight tasks: follow-up of a low hematocrit, screening for cancer using breast exam techniques and PAP smears in women, follow-up of high serum glucose to detect and treat diabetes, monitoring of patients on digoxin to detect drug toxicity, follow-up of a positive urine culture, compliance with the American Academy of Pediatrics standards for screening and immunization, assessment of the risk of dehydration in children, and monitoring and follow-up of children with

otitis media. Findings illustrated that NPs performance were comparable or superior on seven of the eight tasks. Female physicians were better at cancer screening for women.

Salkever, Skinner, and Steinbach (1982) compared the cost and effectiveness of NP and physician care for two common conditions: otitis media (OM) and sore throats. The researchers observed and timed NP and physician visits with patients, and randomly surveyed patients regarding condition severity and changes in status after treatment. After analyzing costs of salary, office space, follow-up visits, ancillary costs and drugs ordered, they computed the cost per episode of care. The researchers discovered that the NPs were 20% less costly in their care and at least as effective as physicians at resolving patient problems.

Avorn, Everitt, and Baker (1991) asked 501 physicians and 298 NPs to consider a case scenario and answer two questions regarding the management plan: "What do you want to know? and "What do you do?" Each was encouraged to ask more information and to design a plan of care. NPs were far more likely to gather additional information and think of the treatment in holistic terms as compared to the physician. No analysis of therapy cost was done. However, when cost of physician treatment plans (prescription medication and no counseling about unhealthy lifestyle) was compared with NP treatment plans (no prescription and counseling regarding

aggravating factors), the NP's treatment plan was considered the more economical approach.

Another important study, by Sakr et al. (1999), aimed to assess the care and outcomes of patients with minor injuries who were managed by a NP or junior doctor (senior house officers) in an emergency department. Although not a study focused on primary care, this was the only study found to directly compare diagnoses made between NP and physicians. Patients ($n$ = 1453) presenting with minor injuries were randomly assigned care by a NP ($n$ = 704) or by a junior doctor ($n$ = 749). Each patient was firstly examined by the NP or junior doctor, and then assessed by an experienced accident and emergency physician (research registrar) who completed a research assessment, but took no part in the clinical management of the patient. A standard form was used to compare the clinical assessment of the NP or junior doctor with the assessment of the research registrar. The primary outcome measure was the adequacy of care (history taking, examination of the patient, interpretation of x-rays, treatment decision, advice, and follow-up). The NPs were better than the junior doctors at recording medical history ($p$ = 0.01) and fewer patients seen by a NP had to seek unplanned follow-up advice about their injury ($p$ = 0.04). There were no significant differences in the accuracy of examination, adequacy of treatment, planned follow-up, or in the ordering or the interpretation of x-rays.

Compared with the rigorous standard of the experienced research registrar, NPs and junior doctors made clinically important errors in 65 (9.2%) of 704 patients and in 80 (10.7%) of 749 patients, respectively. This difference was not significant ($p = 0.2$). The researchers concluded that properly trained NPs, who work within agreed guidelines can provide care for patients with minor injuries that is equal to or better than that provided by junior doctors.

The most recent published research studies related to NPs are presented in the April 15, 2000 British Medical Journal (BMJ). Kinnersley et al. (2000) and Venning, Durie, Roberts, and Leese (2000) conducted similar randomized control trials comparing NP and general practitioners in primary care. Both studies randomized patients to either a NP or physician and collected data by chart audit and patient pre and post visit questionnaire. Kinnersley et al. (2000) compared care providers to ascertain any differences for patients seeking same day consultations in 10 general practices in south Wales and South West England ($n = 1368$). Venning et al. (2000) randomized 1316 patients requesting an appointment the same day in 20 general practices in England and Wales. Patient satisfaction, resolution of symptoms and concerns, care provided (prescriptions, investigations, referrals, recall, and length of consultation), information provided to patients, and patients' intentions for seeking care in the future were the main outcomes measured in both studies. Generally, patients consulting NPs were

significantly more satisfied with their care. Resolution of symptoms and concerns did not differ between the groups, nor was there a significant difference in patterns of prescribing or health status outcome for the two groups.

Though the data from NP practice is impressive, NP independent practices are rare even in the United States (Totten, Lenz, & Mundinger, 1997). Knight Buppert (1995) reported on one NP practice, which had contracted with an HMO as a primary care provider, that performed significantly superior than the aggregate. The NP practice had 48 fewer hospital admissions per 1,000 patients than the aggregate, the average stay of admitted patients was 1.5 days shorter, and the facility cost per admission was over $1,000 less for the NP practice. Sample size was not mentioned in this study. Far more common are NP and physician collaborative practices, for which more research is needed depicting the effectiveness of this partnership.

The only study to date that directly compares NPs and physicians in independent primary care practices that are both similar in terms of responsibilities of the provider and patient panels is a study by Mundinger et al. (2000). They investigated patient care outcomes and found no differences between the outcomes of care provided by physicians and that provided by NPs. They compared NPs and physicians who worked independently from

each other, therefore any potential supervisory relationship would not influence the results. The previous studies had not measured NP practices that had the same degree of independence as the comparison physician practices, nor did previous studies provide direct comparison of outcomes for patients with NP or physician providers. Between August 1995 and October 1997, adult patients were recruited consecutively at one urgent care center and two emergency departments. Patients who reported a previous diagnosis of asthma, diabetes, and / or hypertension, regardless of the reason for the urgent visit, were over-sampled to create a cohort of patients for whom primary care would have an impact on patient outcomes, as had been postulated in previous studies. Patients enrolled (n = 1316) were blindly and randomly assigned an appointment with either the NP (n = 806) or physician (n = 510) for primary care follow-up and ongoing care after an emergency department or urgent care visit. Patient satisfaction after initial appointment (based on a 15-item questionnaire); health status (Medical Outcomes Study Short-Form 36), satisfaction, and physiologic test results (blood pressure for patients with hypertension, peak flow for those with asthma, and HbA1C for those with diabetes) six months later; and service utilization (obtained from computer records) for one year after initial appointment, were compared by type of provider.

No significant differences (NPs versus physicians) were found in patients' health status at six months ($p = 0.92$). Physiologic test results for patients with diabetes ($p = 0.82$) or asthma ($p = 0.77$) were not statistically different. For patients with hypertension, the diastolic pressure was statistically significantly lower for NP patients (82 versus 85 mm Hg; $p = 0.04$). No significant differences were found in health services utilization after either six months or one year. There were no differences in satisfaction ratings following the initial appointment ($p = 0.88$). Satisfaction ratings at six months differed for *provider attributes*, with physicians rated higher (4.2 versus 4.1 on a scale where 5 = excellent; $p = 0.05$). The results of this study strongly supported the hypothesis that, using the traditional medical model of primary care, patient outcomes for NP and physician delivery of primary care do not differ.

## Summary

In summary, empirical research supports claims of NP competence when compared with physician groups. In fact, all of the studies reviewed found equality or superiority of care from NPs when comparing the services delivered by physicians and NPs. Compared to physician patients, NP patients demonstrated equivalent or greater satisfaction with their health provider, and knowledge of their health status and treatment recommendations. In studies that employed randomization to provider,

greater patient compliance with treatment recommendations was shown with NPs than with physicians. In studies that controlled for patient risk in ways other than randomization, patient satisfaction and resolution of pathological conditions were greater for NP patients. In studies that controlled for patient risk, CNMs used less technology and analgesics than did physicians in intra-partum care of obstetric patients. Overall the findings were very favorable for NPs who were equivalent to physicians on most variables measured, which is consistent with the results of the meta-analysis done by Brown and Grimes (1995). However, a number of gaps have been identified in this literature. In general and congruent with those identified by Crosby et al. (1997), the gaps include infrequent measurement of the processes of care of both nurse-providers and physician providers, and infrequent inclusion of important patient outcome variables, such as quality of life, functional status, and avoidance of illness.

The lack of methodological rigor of many of the empirical studies, however, still leaves many unanswered questions. Limitations in data precluded answering questions of why and under what conditions the outcomes may apply. The problems include using small samples, focusing on short-term outcomes, using nonrandomized study populations, using incomplete and unstandardized medical records data, and choosing non-representative samples or sites (Mitchell et al., 1993). With only Salkever et

al. (1982) comparing the cost of care, additional research is needed regarding the cost-effective mix of NP and physician providers. Types of newly emerging delivery systems, and further research with various patient populations are also needed (Brown & Grimes, 1995). The need to establish the efficacy of the APN role through outcome research continues, particularly within the Canadian context.

# CHAPTER THREE

## Method

### Design

A comparative design was used to compare the practices of nurse practitioners (NPs) and primary care physicians (PCPs). A retrospective chart review was performed to gather the diagnostic and prescriptive behavior of NPs and PCPs, as randomization of subjects and manipulation of child visits to health care provider was not within the control of the researcher. Additionally, a chart review was an inexpensive, efficient, and easily accessible means of data collection. The charts of the selected patients were reviewed for demographics, diagnosis, diagnostic tests ordered, treatment prescribed, and follow-up received. Diagnostic and prescriptive behaviors of the NPs and PCPs were also compared to the CMA accepted practice guidelines (Gilbert, Moellering, & Sande, 2000) for infectious diseases in children.

### Sample

Clinical records were reviewed of all children age 1 to 5 years with an infectious disease seen by a NP or PCP at the Pelican Narrows Nursing Station, Saskatchewan between January 1, 2000 and June 30, 2000. This excluded all clinic visits unrelated to infectious conditions, those children that were not seen by a PCP or NP, and those not residing in the Pelican Narrows

community at the time data was reviewed by the researcher. A computerized list of eligible children (generated from a computerized immunization status program currently in use at the Pelican Narrows Nursing Station) provided the initial source for the potential sample. A manual search of the immunization log-book was also done to further reveal children missed from the computerized list. Each clinic visit per child was considered the unit of analysis.

There were three physicians and ten NPs involved in primary care at the Pelican Narrows Nursing Station during the time period of this research study. Nine of the NPs were diploma prepared nurses with special advanced training in primary care and one had a baccalaureate degree in nursing. Most of the special training was completed through the Government of Canada National Nursing Certification Program (NNCP), which was a mandatory requirement of employment, and one had been certified through the Dalhousie Nurse Practitioner Program (S. Laidlaw, personal communication, June 2000). The CNA (1997) describes a NP as a RN who has completed a formal program of academic study and supervised clinical practice, thus being able to perform a wide range of advanced nursing functions, as well as extended functions that traditionally have been performed by physicians. A PCP is a physician working in a primary care setting providing management

of commonly occurring acute and chronic diseases. PCPs function in a generalist role and refer patients to specialist care as needed.

**Setting**

Data were collected at the primary health care clinic in a remote community in northern Saskatchewan. Pelican Narrows is located approximately 120 km north west of Flin Flon, Manitoba and 400 km north east of Prince Albert, Saskatchewan (Appendix A). The main road divides the community with the reserve land on one side and the hamlet (village) land on the other. Pelican Narrows still has the air of isolation and remoteness despite the relatively recent construction of a gravel road from the Hanson Lake Road 15 years ago. Prior to this road being built, access was by plane, boat, or snow machine. The Pelican Narrows band, part of the Peter Ballantyne Cree Nation (PBCN), is established in the Churchill River System area with features of both the Precambrian Shield and the boreal forest. The area is densely forested; the rivers and shorelines have dense growth of long grasses.

The population of Pelican Narrows, the second largest band in the area, is growing quickly. In a six year span (between 1991 and 1996) the community has increased by approximately 40% with a total of 1900 people both on and off reserve land (Appendix B). One of the most outstanding features of this population is the large number of youth members; 47% of the

population is under the age of 15 years (Appendix C). The aging of its young, coupled with increases in population will have major impacts upon the community, its infrastructure, and its health care system (Statistics Canada, 1996).

The population of Pelican Narrows is 95% First Nations people (Cree), with the remaining 5% including non-status and non-native people (Appendix D). There is a very small percentage of Caucasian people, most work as teachers, police, nurses, and store managers. Thus there are few homogeneous culture differences in the population base and the health needs and community planning revolve around the Cree culture. Health indicators still show gross inequities, but there is a movement by the people towards community healing (Health Canada, 1999).

Housing and infrastructure are inextricably linked with health. Poor living conditions are a reflection of poverty and lower socioeconomic circumstances, and have a direct bearing on health in terms of increased rates of infection and chronic disease complications (Young, Bruce, & Elias, 1991). In general the state of living conditions in Pelican Narrows is sub-standard, being far below the standards experienced by the majority of the Canadian population (Appendix E). Overcrowding, need for repairs, poor insulation and ventilation are customary, as are lack of running water, waste disposal, and electricity still a problem for many (G. Michel, Environmental

Technician, personal communication, October, 1999). Aboriginal people are the most marginalized group in Canadian society, with a high proportion living below the poverty line (CMA, 1994). The people of Pelican Narrows are no different. These economic pressures have meshed with other adverse social and historical forces creating a collection of mental, physical, emotional, and spiritual problems which have embedded themselves into this community. This disintegration is thought to have severe effects on all community members; those at most risk are the children.

Unemployment rates are extremely high, as is a low level of education throughout the community (Appendix F and Appendix G). There is a strong need for the development and improvement in educational facilities. More education will increase the marketability of individuals when employment opportunities become available. The lack of accessible recreational facilities is a major concern for much of the population. There is a feeling that the high rates of delinquency, obesity, alcohol and drug problems are partly because people have 'nothing to do'. A new high school, that will support community recreation, is currently under construction.

In 1994, the health care services were transferred from the Medical Services Branch of the Federal Government to local Band control, and are now supervised through the head office in Prince Albert, Saskatchewan (C. Piochion, Nursing Supervisor, personal communication, October, 1999). A

local Health Director and band council are in charge of the health care portfolio. The Health Committee oversees the delivery of services in the community and meets once a month to discuss issues and address concerns. The Director chairs the meeting as well as oversees the day-to day operations of the health centre.

Primary health care is provided by NPs, several Community Health Representatives (CHRs), three Holistic Mental Health care staff, an Environmental Health technician, and numerous support staff. Treatment services are provided on a 24-hour basis. Physician services from Flin Flon are provided up to three times per week and on a consultation basis as needed. Emergency medivacs go to the Flin Flon Hospital for emergency care after being stabilized by the nursing staff at the clinic.

The clinic is overloaded with an average of 2000 patients seen by health care personnel every month (approximately 100 per day). Proactive community health programs are in place but, (due to the constant reactive emergency treatment priorities) are often treated with less of a priority. Subsequently, community programs are not fully implemented due to lack of staff and time (S. Laidlaw, personal communication, October, 1999). Home care nursing is presently delivered by two local native nurses, who each have a caseload of approximately 60.

The above statistics translate into an equally concerning low health status. The North has the highest rates of lung cancer in Saskatchewan, with diabetes also increasing in epidemic proportions. Infectious diseases are well above the provincial average, especially for tuberculosis (TB) and sexually transmitted diseases (STDs). Not surprisingly hospital utilization and the demand for addiction and mental health services remain high (Northern Medical Services, 1999).

**Chart Review Tool**

The chart review tool was grouped into three sections: demographic data, clinical care plan, and clinical outcomes (Appendix H). The tool was developed by the researcher and pre-tested on 15 randomly selected charts of children (ages 1 to 5) attending the Pelican Narrows clinic. The pretest revealed lack of detailed charting, therefore to capture the process of child care consistently, the tool was scaled back to include only the demographics of children and the specified aspects of care. Specifically, data on the age and gender of the child, diagnosis given, whether an antibiotic or other treatment was prescribed, the choice of antibiotic, number of clinic visits, who the health care service was provided by, and follow-up received were recorded. The chart review tool merely provided an efficient means of collecting data in a systematic manner.

**Protocol for Data Collection**

Once a list of children was derived from the computerized immunization program all charts were then accessed and reviewed. All visits per child (ages 1 to 5 years) were analyzed separately and those visits that fit the inclusion criteria of presenting to the NP or PCP with an infectious disease between January 1 and June 30, 2000 were included in the study. Written permission to conduct the chart audit was obtained from the Pelican Narrows Health Centre (Appendix I and J). For reasons of confidentiality, the chart review tool was coded, and the researcher reviewed all charts independently. The retrospective chart review has been used by a variety of researchers and is a well-accepted data collection method for a comparative study (Rudy et al., 1998).

**Data Analysis**

All data were coded and entered into the Statistical Package for the Social Sciences (SPSS) software package version 10.0. The data were compared between the NPs and PCPs groups using descriptive statistics and a Chi-square Test. The 0.05 level of significance was used for the analysis. Finally, a descriptive comparison was conducted between NPs and PCPs in relation to adherence to the CMA accepted practice guidelines (Gilbert, Moellering, & Sande, 2000) for infectious diseases in children (ages 1 to 5).

## Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Board, Capital Health Region. The researcher also obtained approval from the host agency (Appendix I and J). Confidentiality was maintained by using a code number system with the chart review tool. A master sheet with the patient's names and code numbers are kept in a locked cabinet separate from the data, to which only the researcher has access. Data will be stored in a locked cabinet for seven years and then destroyed. Any publications that result from this research will not provide identifying details of the NPs, PCPs, patients, or Pelican Narrows Nursing Station.

# CHAPTER FOUR

## Findings

The purpose of this study was to compare nurse practitioners (NPs) with primary care physicians (PCPs) in the diagnosis and treatment of infectious diseases in children (ages 1 to 5) in a remote setting in northern Saskatchewan. A comparative design was used to compare the practices of NPs and PCPs. A retrospective chart review was performed to gather the diagnostic and prescriptive behavior of NPs and PCPs. The charts of the selected patients were reviewed for demographics, diagnosis, diagnostic tests ordered, treatment prescribed, and follow-up received. Diagnostic and prescriptive behaviors of the NPs and PCPs were also compared to the CMA accepted practice guidelines (Gilbert, Moellering, & Sande, 2000) for infectious diseases in children.

## Description of the Sample

After approval was sought from Peter Ballantyne Health Inc. a computerized list of eligible children, as well as a manual search of the immunization log book were done in order to reveal children aged 1 to 5 years residing in Pelican Narrows, Saskatchewan. To determine eligibility for the study, 379 clinical records were manually reviewed. During the study period (January 1, 2000 to June 30, 2000), a total of 1624 clinic visits were made by these children to the Pelican Narrows Nursing Station. Of these

visits, 639 (39.3 %) did not meet the study's inclusion criteria, and therefore, were excluded from analysis. Reasons for exclusion can be found in Table 1. The sample was individual clinic visits and did not delineate visits per child, but analyzed each visit as a case.

Table 1

Reasons for Exclusion from the Study

| Reason for Exclusion | Frequency | % |
|---|---|---|
| No visits to clinic in time period of study (January 1, 2000 to June 31, 2000) | 19.0 | 1.2 |
| Visit to clinic not related to study | 620.0 | 38.2 |
| Total Visits Excluded | 639.0 | 39.3 |

The final sample consisted of 985 clinic visits with children ranging in age from 1 to 5 years, the majority being Cree speaking, female, and registered Treaty Indians (Table 2). Half of the clinic visits ($n = 540$) were made by children 2 years of age or younger with a mean age of $2.6 \pm 1.4$ years. The number of clinic visits per child ranged from 1 to 26, with a mean of $4.5 \pm 3.8$ visits. Approximately 50% of clinic charts reviewed showed a

frequency of visits to the clinic for infectious disease to be 3 visits or less per child (median = 3.0). The children presented with 12 different diagnoses. The most frequent diagnoses made were upper respiratory tract infection (URTI) (28.2%), skin infection (18.4%), and otitis media (OM) (15.0%) as illustrated in Table 5.

Table 2

Demographics of 985 Clinic Visits Related to Infectious Disease

| Characteristics | Number of Clinic Visits | % of Clinic Visits |
|---|---|---|
| Age | | |
| 1 Year | 295.0 | 29.9 |
| 2 Years | 245.0 | 24.9 |
| 3 Years | 176.0 | 17.9 |
| 4 Years | 128.0 | 13.0 |
| 5 Years | 141.0 | 14.3 |
| Gender | | |
| Male | 459.0 | 46.6 |
| Female | 526.0 | 53.4 |
| Indian Status | | |
| Registered Indian | 982.0 | 99.7 |
| Non-Treaty | 3.0 | 0.3 |

## Comparison of NPs and PCPs

### Children Seen by Health Care Provider

The first research question addressed was whether or not there were differences in the numbers of children (ages 1 to 5) with infectious disease seen by a NP or PCP. Of the 985 clinic visits, 58.3% ($\underline{n} = 574$) of the children were seen by a NP and 41.7% ($\underline{n} = 411$) were seen by the PCP (Table 3). There was a statistically significant difference between the NP and the PCP in the number ($\chi 2 = 27.0$ [1, $\underline{N} = 985$], $\underline{p} = 0.00$) of children seen by health care provider. There was no statistically significant difference between the NP and the PCP in the age ($\chi 2 = 8.24$ [4, $\underline{N} = 985$], $\underline{p} = 0.83$) of children seen by health care provider. Nor was there a significant difference in the gender of child seen by health care provider ($\chi 2 = 0.95$ [1, $\underline{N} = 985$], $\underline{p} = 0.33$) (Tables 3 & 4).

Table 3

Ages of Children Examined Per Visit by Health Care Provider

| Age of Child in Years | NP | PCP | Total | % of Total |
|---|---|---|---|---|
| 1 Year | | | | |
| Frequency | 183.0 | 112.0 | 295.0 | 29.9 |
| Percent | 31.9 | 27.3 | | |
| 2 Years | 138.0 | 107.0 | 245.0 | 24.9 |
| Frequency | 24.0 | 26.0 | | |
| Percent | | | | |
| 3 Years | 101.0 | 75.0 | 176.0 | 17.9 |
| Frequency | 17.6 | 18.2 | | |
| Percent | | | | |
| 4 Years | 82.0 | 46.0 | 128.0 | 13.0 |
| Frequency | 14.3 | 11.2 | | |
| Percent | | | | |
| 5 Years | 70.0 | 71.0 | 141.0 | 14.3 |
| Frequency | 12.2 | 17.3 | | |
| Percent | | | | |
| Total | 574.0 | 411.0 | 985.0 | |

Table 4

Gender of Children Examined Per Visit by Health Care Provider

| Gender of Child | NP | PCP | Total | % of Total |
|---|---|---|---|---|
| Male | | | | |
| Frequency | 275.0 | 184.0 | 459.0 | 46.6 |
| Percent | 47.9 | 44.8 | | |
| Female | | | | |
| Frequency | 299.0 | 227.0 | 526.0 | 53.4 |
| Percent | 52.1 | 55.2 | | |

**Diagnosis of Children Seen by Health Care Provider**

The second research question addressed the relationship between the health care provider (NP or PCP) and the diagnosis assigned to the child. The children presented with 12 different diagnoses (Table 5). The most frequent diagnoses made were upper respiratory tract infection (URTI) (28.2%), skin infection (18.4%), and otitis media (OM) (15.0%); the least frequent diagnoses were dental infections and urinary tract infections (UTI). There was no statistically significant difference in the diagnosis of the child seen per health care provider ($\chi 2 = 13.5$ [11, $N = 985$], $p = 0.26$).

Table 5

Specific Infectious Disease Diagnosed Per Visit by Health Care Provider

| Diagnosis | HealthCare Provider | | Total | % of Total |
|---|---|---|---|---|
| | NP | PCP | | |
| URTI | | | | |
| Frequency | 151.0 | 127.0 | 278.0 | 28.2 |
| Percent | 26.3 | 30.9 | | |
| Skin Infection | | | | |
| Frequency | 105.0 | 76.0 | 181.0 | 8.4 |
| Percent | 18.3 | 18.5 | | |
| OM | | | | |
| Frequency | 89.0 | 59.0 | 148.0 | 15.0 |
| Percent | 15.5 | 14.4 | | |
| OM & RTI | | | | |
| Frequency | 42.0 | 42.0 | 84.0 | 8.5 |
| Percent | 7.3 | 10.2 | | |
| Gastric Infection | | | | |
| Frequency | 38.0 | 23.0 | 61.0 | 6.2 |
| Percent | 6.6 | 5.6 | | |
| Pharyngitis / Throat | | | | |
| Frequency | 38.0 | 14.0 | 52.0 | 5.3 |
| Percent | 6.6 | 3.4 | | |
| LRTI | | | | |
| Frequency | 27.0 | 20.0 | 47.0 | 4.8 |
| Percent | 4.7 | 4.9 | | |
| Dental | | | | |
| Frequency | 16.0 | 14.0 | 30.0 | 3.0 |
| Percent | 2.8 | 3.4 | | |
| OM & Skin | | | | |
| Frequency | 21.0 | 9.0 | 30.0 | 3.0 |
| Percent | 3.7 | 2.2 | | |
| Other | | | | |
| Frequency | 20.0 | 8.0 | 28.0 | 2.8 |
| Percent | 3.5 | 1.9 | | |
| URTI & Skin | | | | |
| Frequency | 15.0 | 10.0 | 25.0 | 2.5 |
| Percent | 2.6 | 2.4 | | |
| UTI | | | | |
| Frequency | 12.0 | 9.0 | 21.0 | 2.1 |
| Percent | 2.1 | 2.2 | | |

**Diagnostic Tests Ordered by Health Care Provider**

The third research question was if there was a difference in the diagnostic tests ordered by a NP or PCP in the management of children with infectious diseases. The majority of children had no diagnostic test ordered by a NP or PCP (88.6%) as illustrated in Table 6. The most frequent diagnostic tests ordered were ear swabs for culture and sensitivity (C&S), which were more frequently ordered by a NP ($n = 35$) than a PCP ($n = 8$). However, there was no statistically significant difference between the NP and PCP in the type and frequency of diagnostic tests ordered ($\chi 2 = 14.5$ [4, $N = 985$], $p = 0.06$).

Table 6

Diagnostic Tests Ordered Per Visit by Health Care Provider

| Diagnostic Test | Health Care Provider | | Total | % of Total |
|---|---|---|---|---|
| | NP | PCP | | |
| None | | | | |
| Frequency | 495.0 | 378.0 | 873.0 | 88.6 |
| Percent | 86.2 | 92.0 | | |
| Swab (C&S) | | | | |
| Frequency | 35.0 | 8.0 | 43.0 | 4.4 |
| Percent | 6.1 | 1.9 | | |
| Urine (UA, C&S) | | | | |
| Frequency | 10.0 | 11.0 | 21.0 | 2.1 |
| Percent | 1.7 | 2.7 | | |
| Stools (O&P, C&S) | | | | |
| Frequency | 18.0 | 7.0 | 25.0 | 2.5 |
| Percent | 3.1 | 1.7 | | |
| Other (SBS, Sputum, CBC, TBN, HGB) | | | | |
| Frequency | 16.0 | 7.0 | 23.0 | 2.3 |
| Percent | 2.8 | 1.7 | | |

**Treatments Prescribed by Health Care Provider**

The fourth research question examined the difference in treatments prescribed by a NP or PCP in the management of children (ages 1 to 5 years) with infectious diseases. An analysis of medications prescribed revealed a statistically significant difference between NPs and PCPs in the class of antibiotic prescribed ($\chi 2 = 43.8$ [7, $\underline{N} = 985$], $\underline{p} = 0.00$) (Table 7). Overall,

PCPs prescribed significantly more sulfa and cephalosporin antibiotics, while NPs prescribed more macrolides, topical, otic, and optic solutions. Penicillin drugs were the most commonly prescribed antibiotics by NPs (41.5%) and PCPs (39.9%). NPs (35.2%) and PCPs (34.8%) were consistent in their frequency of not prescribing an antibiotic. As well, as a statistically significant difference was found in the type and frequency of antibiotics recommended per diagnosis ($\chi 2 = 739.5$ [77, $\underline{N} = 985$], $p = 0.00$) (Tables 8a & 8b).

Table 7

Antibiotic Treatment Prescribed Per Visit by Health Care Provider

| Antibiotic Treatment Prescribed | Health Care Provider | | Total | % of Total |
|---|---|---|---|---|
| | NP | PCP | | |
| None | | | | |
| Frequency | 202.0 | 143.0 | 345.0 | 35.0 |
| Percent | 35.2 | 34.8 | | |
| Penicillins | | | | |
| Frequency | 238.0 | 164.0 | 402.0 | 40.8 |
| Percent | 41.5 | 39.9 | | |
| Sulfa | | | | |
| Frequency | 22.0 | 39.0 | 61.0 | 6.2 |
| Percent | *3.8 | 9.5 | | |
| Cephalosporins | | | | |
| Frequency | 24.0 | 41.0 | 65.0 | 6.6 |
| Percent | *4.2 | 10.0 | | |
| Macrolides | | | | |
| Frequency | 32.0 | 8.0 | 40.0 | 4.1 |
| Percent | *5.6 | 1.9 | | |
| Topical Solution | | | | |
| Frequency | 28.0 | 8.0 | 36.0 | 3.7 |
| Percent | 4.9 | 1.9 | | |
| Otic / Optic Solution | | | | |
| Frequency | 22.0 | 6.0 | 28.0 | 2.8 |
| Percent | 3.8 | 1.5 | | |
| Other | | | | |
| Frequency | 6.0 | 2.0 | 8.0 | 0.8 |
| Percent | 1.0 | 0.5 | | |

Note: * $p \leq 0.05$.

Table 8a

Antibiotic Treatment Prescribed Per Diagnosis Given by NP

| Health Care Provider NP | Antibiotic Treatment Prescribed | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| Diagnosis Given | None | Pen-icillins | Sulfa | Cephalo sporins | Macro lides | Top - Sol | Otic/ optic | Other | |
| **OM** | | | | | | | | | |
| Frequency | 8.0 | 56.0 | 11.0 | 6.0 | | 1.0 | 6.0 | 1.0 | 89.0 |
| Percent within Diagnosis Given | 9.0 | 62.9 | 12.4 | *6.7 | | 1.1 | 6.7 | 1.1 | |
| Percent within Antibiotic Prescribed | 4.0 | 23.5 | 50.0 | 25.0 | | 3.6 | 27.3 | 16.7 | 15.5 |
| Percent of Total | 1.4 | 9.8 | 1.9 | 1.0 | | 0.2 | 1.0 | 0.2 | |
| **Skin Infection** | 7.0 | 64.0 | 1.0 | 7.0 | 7.0 | 19.0 | | | 105.0 |
| Frequency | 6.7 | 61.0 | *1.0 | 6.7 | *6.7 | *18.1 | | | |
| Percent within Diagnosis Given | 3.5 | 26.9 | 4.5 | 29.2 | 21.9 | 67.9 | | | 18.3 |
| Percent within Antibiotic Prescribed | 1.2 | 11.1 | 0.2 | 1.2 | 1.2 | 3.3 | | | |
| Percent of Total | | | | | | | | | |
| **Pharyngitis / Throat** | | | | | | | | | |
| Frequency | 13.0 | 19.0 | | | 6.0 | | | | 38.0 |
| Percent within Diagnosis Given | *34.2 | *50.0 | | | *15.8 | | | | |
| Percent within Antibiotic Prescribed | 6.4 | 8.0 | | | 18.8 | | | | 6.6 |
| Percent of Total | 2.3 | 3.3 | | | 1.0 | | | | |
| **URTI** | | | | | | | | | |
| Frequency | 126.0 | 18.0 | | | 4.0 | 1.0 | 1.0 | 1.0 | 151.0 |
| Percent within Diagnosis Given | 83.4 | 11.9 | | | 2.6 | 0.7 | 0.7 | 0.7 | |
| Percent within Antibiotic Prescribed | 62.4 | 7.6 | | | 12.5 | 3.6 | 4.5 | 16.7 | 26.3 |
| Percent of Total | 22.0 | 3.1 | | | 0.7 | 0.2 | 0.2 | 0.2 | |
| **LRTI** | | | | | | | | | |
| Frequency | 5.0 | 17.0 | | | 5.0 | | | | 27.0 |
| Percent within Diagnosis Given | *18.5 | *63.0 | *0.0 | | *18.5 | | | | |
| Percent within Antibiotic Prescribed | 2.5 | 7.1 | | | 15.6 | | | | 4.7 |
| Percent of Total | 0.9 | 3.0 | | | 0.9 | | | | |
| **UTI** | | | | | | | | | |
| Frequency | 5.0 | 2.0 | 4.0 | 1.0 | | | | | 12.0 |
| Percent within Diagnosis Given | 41.7 | *16.7 | *33.3 | 8.3 | | | | | |
| Percent within Antibiotic Prescribed | 2.5 | 0.8 | 18.2 | 4.2 | | | | | 2.1 |
| Percent of Total | 0.9 | 0.3 | 0.7 | 0.2 | | | | | |
| **Dental** | | | | | | | | | |
| Frequency | 4.0 | 12 | | | | | | | 16.0 |
| Percent within Diagnosis Given | *25.0 | *75.0 | | | | | | | |
| Percent within Antibiotic Prescribed | 2.0 | 5.0 | | | | | | | 2.8 |
| Percent of Total | 0.7 | 2.1 | | | | | | | |

Table 8a continued

| Health Care Provider NP / Diagnosis Given | Antibiotic Treatment Prescribed | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | None | Pen-icillins | Sulfa | Cephalo sporins | Macro lides | Top - Sol | Otic/ optic | Other | |
| **Gastric Infection** | | | | | | | | | |
| Frequency | 32.0 | 2.0 | 1.0 | | | 1.0 | 1.0 | 1.0 | 38.0 |
| Percent within Diagnosis Given | 84.2 | 5.3 | *2.6 | | | 2.6 | 2.6 | 2.6 | |
| Percent within Antibiotic Prescribed | 15.8 | 0.8 | 4.5 | | | 3.6 | 4.5 | 16.7 | 6.6 |
| Percent of Total | 5.6 | 0.3 | 0.2 | | | 0.2 | 0.2 | 0.2 | |
| **OM & Skin** | | | | | | | | | |
| Frequency | 1.0 | 7.0 | 2.0 | 7 | 2.0 | 1.0 | 1.0 | | 21.0 |
| Percent within Diagnosis Given | 4.8 | 33.3 | *9.5 | 33.3 | 9.5 | 4.8 | 4.8 | | |
| Percent within Antibiotic Prescribed | 0.5 | 2.9 | 9.1 | 29.2 | 6.3 | 3.6 | 4.5 | | 3.7 |
| Percent of Total | 0.2 | 1.2 | 0.3 | 1.2 | 0.3 | 0.2 | 0.2 | | |
| **Skin & URTI** | | | | | | | | | |
| Frequency | | 6.0 | | 2.0 | 2.0 | 5.0 | | | 15.0 |
| Percent within Diagnosis Given | | *40.0 | *0.0 | *13.3 | *13.3 | *33.3 | | | |
| Percent within Antibiotic Prescribed | | 2.5 | | 8.3 | 6.3 | 17.9 | | | 2.6 |
| Percent of Total | | 1.0 | | 0.3 | 0.3 | 0.9 | | | |
| **Other** | | | | | | | | | |
| Frequency | | 5.0 | | | 1.0 | | 13.0 | 1.0 | 20.0 |
| Percent within Diagnosis Given | | 25.0 | | | 5.0 | | 65.0 | 5.0 | |
| Percent within Antibiotic Prescribed | | 2.1 | | | 3.1 | | 59.1 | 16.7 | 3.5 |
| Percent of Total | | 0.9 | | | 0.2 | | 2.3 | 0.2 | |
| **OM & RTI** | | | | | | | | | |
| Frequency | 1.0 | 30.0 | 3.0 | 1.0 | 5.0 | | | 2.0 | 42.0 |
| Percent within Diagnosis Given | 2.4 | *71.4 | 7.1 | *2.4 | 11.9 | | | 4.8 | |
| Percent within Antibiotic Prescribed | 0.5 | 12.6 | 13.6 | 4.2 | 15.6 | | | 33.3 | 7.3 |
| Percent of Total | 0.2 | 5.2 | 0.5 | 0.2 | 0.9 | | | 0.3 | |
| **Total** | | | | | | | | | |
| Frequency | 202 | 238.0 | 22.0 | 24.0 | 32.0 | 28.0 | 22.0 | 6.0 | 574 |
| Percent of Total | 35.2 | 41.5 | *3.8 | *4.2 | *5.6 | *4.9 | *3.8 | 1.0 | |

Note: * $p \leq 0.05$.

Table 8b

Antibiotic Treatment Prescribed per Diagnosis Given by PCP

| Health Care Provider PCP / Diagnosis Given | Antibiotic Treatment Prescribed | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | None | Penicillins | Sulfa | Cephalosporins | Macrolides | Top-Sol | Otic/optic | Other | |
| **OM** | | | | | | | | | |
| Frequency | 4.0 | 26.0 | 5.0 | 16.0 | 2.0 | 1.0 | 4.0 | 1.0 | 59.0 |
| Percent within Diagnosis Given | 6.8 | 44.1 | 8.5 | *27.1 | 3.4 | 1.7 | 6.8 | 1.7 | |
| Percent within Antibiotic Prescribed | 2.8 | 15.9 | 12.8 | 39.0 | 25.0 | 12.5 | 66.7 | 50.0 | 14.4 |
| Percent of Total | 1.0 | 6.3 | 1.2 | 3.9 | 0.5 | 0.2 | 1.0 | 0.2 | |
| **Skin Infection** | | | | | | | | | |
| Frequency | 3.0 | 47.0 | 14.0 | 5.0 | 2.0 | 5.0 | | | 76.0 |
| Percent within Diagnosis Given | 3.9 | 61.8 | *18.4 | 6.6 | *2.6 | *6.6 | | | |
| Percent within Antibiotic Prescribed | 2.1 | 28.7 | 35.9 | 12.2 | 25.0 | 62.5 | | | 18.5 |
| Percent of Total | 0.7 | 11.4 | 3.4 | 1.2 | 0.5 | 1.2 | | | |
| **Pharyngitis / Throat** | | | | | | | | | |
| Frequency | 3.0 | 11.0 | | | | | | | 14.0 |
| Percent within Diagnosis Given | *21.4 | *78.6 | | | *0.0 | | | | |
| Percent within Antibiotic Prescribed | 2.1 | 6.7 | | | | | | | 3.4 |
| Percent of Total | 0.7 | 2.7 | | | | | | | |
| **URTI** | | | | | | | | | |
| Frequency | 105.0 | 19.0 | 1.0 | | 2.0 | | | | 127 |
| Percent within Diagnosis Given | 82.7 | 15.0 | 0.8 | | 1.6 | | | | |
| Percent within Antibiotic Prescribed | 73.4 | 11.6 | 2.6 | | 25.0 | | | | 30.9 |
| Percent of Total | 25.5 | 4.6 | 0.2 | | 0.5 | | | | |
| **LRTI** | | | | | | | | | |
| Frequency | 2.0 | 15.0 | 1.0 | | 2.0 | | | | 20 |
| Percent within Diagnosis Given | *10.0 | *75.0 | *5.0 | | *10.0 | | | | |
| Percent within Antibiotic Prescribed | 1.4 | 9.1 | 2.6 | | 25.0 | | | | 4.9 |
| Percent of Total | 0.5 | 3.6 | 0.2 | | 0.5 | | | | |
| **UTI** | | | | | | | | | |
| Frequency | 4.0 | | 4.0 | 1.0 | | | | | 9.0 |
| Percent within Diagnosis Given | 44.4 | *0.0 | *44.4 | 11.1 | | | | | |
| Percent within Antibiotic Prescribed | 2.8 | | 10.3 | 2.4 | | | | | 2.2 |
| Percent of Total | 1.0 | | 1.0 | 0.2 | | | | | |
| **Dental** | | | | | | | | | |
| Frequency | 2.0 | 12.0 | | | | | | | 14.0 |
| Percent within Diagnosis Given | *14.3 | *85.7 | | | | | | | |
| Percent within Antibiotic Prescribed | 1.4 | 7.3 | | | | | | | 3.4 |
| Percent of Total | 0.5 | 2.9 | | | | | | | |

Table 8b continued

| Health Care Provider PCP / Diagnosis Given | Antibiotic Treatment Prescribed | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | None | Penicillins | Sulfa | Cephalosporins | Macrolides | Trop - Sol | Oint/ optic | Other | |
| **Gastric Infection** | | | | | | | | | |
| Frequency | 17.0 | | 3.0 | 1.0 | | 1.0 | | 1.0 | 23.0 |
| Percent within Diagnosis Given | 73.9 | | *13.0 | 4.3 | | 4.3 | | 4.3 | |
| Percent within Antibiotic Prescribed | 11.9 | | 7.7 | 2.4 | | 12.5 | | 50.0 | 5.6 |
| Percent of Total | 4.1 | | 0.7 | 0.2 | | 0.2 | | 0.2 | |
| **OM & Skin** | | | | | | | | | |
| Frequency | | 2.0 | 4.0 | 3.0 | | | | | 9.0 |
| Percent within Diagnosis Given | | 22.2 | *44.4 | 33.3 | | | | | |
| Percent within Antibiotic Prescribed | | 1.2 | 10.3 | 7.3 | | | | | 2.2 |
| Percent of Total | | 1.0 | 1.0 | 0.7 | | | | | |
| **Skin & URTI** | | | | | | | | | |
| Frequency | | 2.0 | 4.0 | 3.0 | | 1.0 | | | 10.0 |
| Percent within Diagnosis Given | | *20.0 | *40.0 | *30.0 | *0.0 | *10.0 | | | |
| Percent within Antibiotic Prescribed | | 1.2 | 10.3 | 7.3 | | 12.5 | | | 2.4 |
| Percent of Total | | 0.5 | 1.0 | 0.7 | | 0.2 | | | |
| **Other** | | | | | | | | | |
| Frequency | 1.0 | 4.0 | | 1.0 | | | 2.0 | | 8.0 |
| Percent within Diagnosis Given | 12.5 | 50.0 | | 12.5 | | | 25.0 | | |
| Percent within Antibiotic Prescribed | 0.7 | 2.4 | | 2.4 | | | 33.3 | | 1.9 |
| Percent of Total | 0.2 | 1.0 | | 0.2 | | | 0.5 | | |
| **OM & RTI** | | | | | | | | | |
| Frequency | 2.0 | 4.0 | 3.0 | 11.0 | | | | | 42.0 |
| Percent within Diagnosis Given | 4.8 | *50.0 | 7.1 | *26.2 | | | | | |
| Percent within Antibiotic Prescribed | 1.4 | 2.4 | 7.7 | 26.8 | | | | | 10.2 |
| Percent of Total | 0.5 | 1.0 | 0.7 | 2.7 | | | | | |
| **Total** | | | | | | | | | |
| Frequency | 143.0 | 164.0 | 39.0 | 41.0 | 8.0 | 8.0 | 6.0 | 2.0 | 411 |
| Percent of Total | 34.8 | 39.9 | *9.5 | *10.0 | *1.9 | *1.9 | *1.5 | 0.5 | |

Note: * $p \leq 0.05$.

**Follow-up Practices of Health Care Provider**

The next research question addressed the follow-up practices of the NPs and PCPs in the management of children (ages 1 to 5) with infectious diseases. Follow-up was documented as simply yes or no: if requested or not delineated. There was a statistically significant difference between NPs and PCPs in the frequency of follow-up suggested ($\chi 2 = 40.2$ [1, $N = 985$], $p = 0.00$). The NPs were divided, with approximately half of the children visits having a requested follow-up (41.5%), with no follow-up being delineated for the remainder (58.5%). A majority (77.9%) of the PCPs did not indicate as to whether follow-up was needed for the children seen with infectious diseases.

**Adherence to CMA Practice Standards by Health Care Providers**

The final research question compared the practice of NPs and PCPs in their adherence to the accepted CMA practice guidelines (Gilbert, Moellering, & Sande, 2000) for the management of children (ages 1 to 5) with infectious diseases. The purpose was to describe and compare the clinic visits resulting in prescription of antibiotics and the diagnoses given; efficacy was not examined. There were no significant differences between NPs and PCPs in their rate and choice of antibiotic treatment compared to the best practice recommendations. URTI was the most commonly diagnosed illness in the children, with the majority not receiving antibiotics. The CMA advocates against the use of antibiotic treatment in URTIs stating the lack of

from antimicrobial therapy when treating illness that is primarily nonbacterial in nature is rarely indicated. The antibiotic most commonly used for OM and skin infections was penicillin, which is consistent with the CMA accepted recommendations. Cephalosporin drugs were most commonly prescribed by both NPs and PCP when more than one diagnosis was given. Both health care providers treated pharyngitis or throat infections empirically. The CMA accepted recommendations specify verification of bacterial colonization of the pharyngeal-tonsil area before treatment, with the treatment based on the culture and sensitivity (C&S) results. Furthermore, when UTI was diagnosed, half of the time both NPs and PCPs did not provide antibiotic treatment. Due to the significant morbidity in children associated with UTI, recommended treatment is to begin with a broad-spectrum antibiotic and to be tailored with the results of the urine culture and sensitivity (Ahmed & Swedlund, 1998).

# CHAPTER FIVE

## Discussion

This study examined practices of nurse practitioners (NP) and primary care physicians (PCP) in the diagnosis and management of infectious diseases in children (ages 1 to 5). Data were collected retrospectively by chart review and analyzed using a comparative study design. The final sample consisted of 985 clinic visits to the Pelican Narrows Nursing Station between January 1, 2000 and June 30, 2000 by the children who met the study inclusion criteria. Using chi-square analyses and an alpha level of 0.05, there were found to be some significant differences between NPs and PCPs in the management of infectious disease in children (ages 1 to 5) in Pelican Narrows. A statistically significant difference was found in the numbers of children seen per health care provider. Furthermore, NPs and PCPs in Pelican Narrows prescribed antibiotics equally, but there were statistically significant differences in the type and frequency of antibiotics prescribed per diagnosis and in the follow up suggested by health care provider. There were no statistically significant differences found in the age, gender, and diagnoses of children seen, or the diagnostic tests ordered by health care provider in the management of infectious diseases in children (ages 1 to 5) in Pelican Narrows.

The findings of this study indicated that NPs provide health care services that are similar to those provided by PCPs in the management of ambulatory infectious diseases in children (ages 1 to 5) in the same office based practice. While this study does indicate that there were some differences between NPs and PCPs in the empiric management of ambulatory pediatric children, there is no claim that one group's practice is superior to the other, nor does this study attempt to address the issue of patient satisfaction or cost effectiveness.

## Comparing NP and Physician Practice Patterns

### Children Seen by Health Care Provider

The demographics of the sample of children seen by health care provider were very similar. Of the 985 clinic visits, 58.3% of the children were seen by a NP and 41.7% were seen by a PCP. The children ranged in age from 1 to 5 years, with an average age of 2.6 years. Since the entire population of children (aged 1 to 5) in Pelican Narrows was used in the sample it was expected that the children's ages and gender would be of normal distribution. Pelican Narrows is part of the Peter Ballantyne Cree Nation (PBCN), an Indian Band, therefore it was expected that most of the children would be of registered Indian status (99.7%).

At the time of this study, January 1, 2000 to June 30, 2000, the Pelican Narrows clinic operated on a 'walk in' basis; generally no

appointments were pre-booked. The number of physician days to the clinic were approximately three times a week, but were variable depending on physician availability, weather, and clinic hours. The NPs examined patients in a parallel clinic during regular office hours as well as evenings and weekends with a physician on-call by telephone for advice.

**Diagnosis of Children Seen by Health Care Provider**

Otitis media (OM), upper respiratory tract infection (URTI), gastroenteritis (GE), and skin and soft tissue infections present among the most frequent diagnoses in pediatric or family practice, and are endemic to most isolated northern communities in Canada (Dowell, Schwartz, & Phillips 1998; Gant, Kaye, & Weart, 1995; Health Canada, 1997). Therefore, it was not surprising to see these conditions as the most common diagnoses cited by health care providers in Pelican Narrows. Other diagnoses included pharyngitis, lower respiratory tract infection (LRTI), and urinary tract infection (UTI). There were no significant differences found between NPs and PCPs in the diagnosis of children seen with infectious disease. These findings are independent of the literature reviewed; no research was found that compared diagnoses between health care providers (Brown & Grimes, 1996; Sakr et al., 1999). This study investigated the diagnosis assigned and does not address the accuracy of clinical decision making. The study by Sakr et al. (1999) compared the care for patients with minor injuries provided by

with that provided by physicians. Previous published studies of the effectiveness of NPs focused on patients' satisfaction or particular practical skills of nurses; none have attempted to assess longer-term care.

**Diagnostic Tests Ordered**

The majority of children seen in the Pelican Narrows Nursing Station had no diagnostic tests ordered by either a NP or PCP. The Nursing Station does have a small lab equipped with urine dipsticks, hemoglobin testing, and blood glucose monitoring which can be used and interpreted immediately by the health care provider. The lab is able to provide most other lab services, specimens are sent to Flin Flon daily and results are reported within the week. From the researchers experience in this clinic, the lag time between specimen collection and available result has impeded the process of proper diagnostic testing on a regular basis. No radiographic services are available in Pelican Narrows. If a patient is deemed to need x-rays, they are sent by a taxi or ambulance to Flin Flon General Hospital. Therefore, x-rays are not routinely ordered. Throat cultures are recommended in all of the literature related to the management of pharyngitis. In a facility equipped with rapid antigen detection testing (RADT), which detects the presence of Group A streptococcal carbohydrate on a throat swab, this is recommended before treatment is commenced and then confirmed by a throat culture. This test is not available in Pelican Narrows nor is it used at the Flin Flon General

Hospital. If a child presents with "sore throat" they are treated empirically. Swabs for C&S are available but rarely used in the Pelican Narrows clinic. Not only is the lag time between testing and results an impedance, but also the poor compliance and follow-up of the population in the community. This is consistent with research done by Health Canada (1997) noting the lower compliance rates among aboriginal people (compared to non-aboriginal people) to modern medicine. Other researchers have noted that NPs ordered slightly more laboratory tests than physicians, but these tests were less expensive than tests ordered by physicians (Brown & Grimes, 1998).

**Treatment Prescribed**

When describing and comparing the treatment prescribed by health care providers in Pelican Narrows it is important to first understand the structure of the clinic. A well-stocked pharmacy is available in the clinic where NPs and PCP may give medications, both prescription and non-prescription, to patients from existing clinic stock. The PBCN Drug Formulary restricts the type of medication given by NPs who can not legally sign prescriptions that will be filled at a pharmacy elsewhere. If the PCP chooses a drug that is not on the formulary he may write a prescription and have the patient fill it in Flin Flon, or have the drug sent up to Pelican Narrows with the next stock order (2-3 days). At the time of this study NPs were not permitted to independently write prescriptions, thus a physician's

signature was required. This greatly limits the use of newer, albeit, more expensive drugs and therefore decreases the choice to the health care provider.

The majority of patients seen at the Pelican Narrows Nursing Station were prescribed an antibiotic (65%). The rates of drug prescriptions were equivalent between doctors and nurses, which has also been observed in the literature (Brown & Grimes, 1998). In terms of the type of antibiotics, NPs prescribed penicillin based drugs more frequently than PCPs, whereas PCPs prescribed sulfa-based antibiotics and cephalosporins significantly more frequently. It may be argued that antibiotic prescriptions among both groups of health care providers in this study are higher than need be, which is consistent with reports in the literature that many clinicians prescribe antibiotics when they diagnose an URTI, typically viral in nature (Dowell, Schwartz, & Phillips 1998). NPs and PCPs agreed on the most common pharmacological agents. Several studies have reported that NPs do not prescribe the diversity and complexity of drugs that medical practitioners prescribe (Moody, Smith, & Glen, 1999). This was also seen in this study, with PCPs prescribing more cephalosporins in situations where penicillins would have likely been appropriate. In all of the studies reviewed, NPs and physicians prescribe antibiotics for a similar proportion of patients.

**Follow-up Suggested**

A significant difference was found in the follow-up suggested when comparing NPs and PCPs. This finding is different than a study by Kinnersley et al. (2000) where there was no difference between the two groups in the rate of advice given to return for routine review. This may have simply been lack of charting on the PCPs part. On review of the charts it was noticed that the notes made by PCPs were generally shorter than what was charted by NPs, with commonly only the diagnosis and treatment prescribed documented. Since neither of the health care providers was aware of the study, as the chart review was done retrospectively, this could not have skewed the charting practices of the health care providers.

**Adherence to Practice Standards**

An attempt was made to audit practice against published guidelines with the basis of comparison being adherence to current best practice. There were no standard guidelines used by the clinicians, therefore comparing the management choices of health care provider could not be quantified. Considering the wide range of clinical judgement in the treatment of infectious diseases, this proved to be a difficult task. The CMA does have treatment guidelines for the treatment of OM and pharyngitis (Canadian Paediatric Society, 1998); however, no published Canadian guidelines were available for the management of respiratory tract, skin or gastric infections.

The Sanford Guide to Antimicrobial Therapy (2000) is often used by physicians and is accepted by medical associations throughout the world. The Sanford Guide is not prepared for any single pharmaceutical company or distributor; it has been independently prepared and published since its inception based on reports in peer-reviewed publications (Gilbert, Moellering, & Sande, 2000).

Excluding the diagnosis of UTI, there were no significant differences between NPs and PCPs in their rate and choice of antibiotic treatment compared to the best practice recommendations (Gilbert, Moellering, & Sande, 2000). Diagnostic tests were rarely ordered, therefore most infections were treated with broad empiric therapy. URTI was the most commonly diagnosed illness in the children, with the majority not receiving antibiotics. The CMA accepted practice standards do advocate against the unwarranted use of antibiotics in the treatment of illness that is primarily nonbacterial in nature.

## Implications of the Study

The chart review findings support the literature in that NP and PCP can reconstitute and rearrange their roles in many ways, depending largely on local needs and circumstances. Although significant data were obtained via a chart review, it is not warranted to alter practice solely based on these findings. The health problems in this study are frequent reasons for seeking

traditional health care services, and the findings of this study indicate that they can be successfully and satisfactorily managed by NPs. There is a trend towards increasing numbers of ANP positions in health care. ANPs need to invest in the development of practice models to promote recognition as a legitimate health care provider option to increase the availability and accessibility of health care. Important future research ideally will have measurements of effectiveness, including the costs of care by provider and patient outcomes.

## Limitations of the Study

The purpose of this study was to identify practice styles in the diagnosis and management of childhood infectious diseases. The contribution of a chart review may be in the encouragement it offers those involved in providing care to think about what they are doing and the effect it has on improving patient health. Although a comparative design cannot determine causal relationships among variables, it does provide a closer evaluation of what the relationship might be between the variables. Chart recording of clinical practice is insufficient to neither reflect actual process of care nor is it an accurate measure of actual practice. More importantly, it provides essential information that directs the practitioner in identifying next steps for ongoing studies. Chart reviews often present challenges for the researcher due to inconsistencies in charting and incomplete data. Finally, a variable

that was not considered in the research was the issue of cost. The cost savings were not only in the differences in salary between NP and PCPs but also savings to the health facility in decreased length of stay, reduced complications, and a decrease in diagnostic tests, and medications ordered. Further, an attempt was not made to compare the satisfaction of either health care provider.

## Conclusion

In descriptive retrospective studies such as this, reviewing clinical records is often the sole means of gathering data. Despite limitations to the chart review approach, (retrospective design and a non-random sample), this comparative study provides a valuable comparison of NPs and PCPs in the diagnosing and prescribing of infectious diseases in children (ages 1 to 5) in Pelican Narrows. Findings from this study cannot be generalized beyond this practice setting. However, the findings do provide further support for the development and promotion of APN roles as an effective strategy to improve the delivery of health care services and impact positively upon patient care outcomes.

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# APPENDIX A

## Map

(http://142.206.70.241/CensusSearchMap/temp/DoMap5086345.gif)

# APPENDIX B

Population Statistics for Pelican Narrows, Saskatchewan

| Characteristics | Pelican Narrows Indian Reserve | Pelican Narrows Village | Saskatchewan |
|---|---|---|---|
| Population in 1996 | 1,404.0 | 445.0 | 990,237.0 |
| Population in 1991 | 1,130.0 | 252.0 | 988,928.0 |
| 1991 to 1996 population change | 24.2 | 76.6 | 0.1 |
| Land area (square km) | 4.5 | 3.4 | 570,113.5 |

(Statistics Canada, 1996)

# APPENDIX C

## Detailed Population Statistics for Pelican Narrows, Saskatchewan

| Characteristics | Indian Reserve | | | Village | | | Saskatchewan | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| Aboriginal Population | 1,385.0 | 710.0 | 670.0 | 405.0 | 200.0 | 205.0 | 111,245.0 | 54,465.0 | 56,775.0 |
| Age Characteristics of the Population | | | | | | | | | |
| Total – All persons | 1,405.0 | 720.0 | 685.0 | 445.0 | 225.0 | 220.0 | 990,235.0 | 489,425.0 | 500,815.0 |
| Age 0 – 4 | 260.0 | 140.0 | 120.0 | 100.0 | 50.0 | 50.0 | 70,275.0 | 36,040.0 | 34,235.0 |
| Age 5 – 14 | 410.0 | 200.0 | 215.0 | 105.0 | 55.0 | 50.0 | 158,315.0 | 81,065.0 | 77,245.0 |
| Age 15 – 19 | 140.0 | 80.0 | 65.0 | 40.0 | 20.0 | 20.0 | 76,595.0 | 39,320.0 | 37,275.0 |
| Age 20 – 24 | 120.0 | 65.0 | 55.0 | 50.0 | 15.0 | 30.0 | 64,760.0 | 32,675.0 | 32,085.0 |
| Age 25 – 54 | 390.0 | 205.0 | 190.0 | 140.0 | 70.0 | 70.0 | 393,725.0 | 196,740.0 | 196,980.0 |
| Age 55 – 64 | 45.0 | 25.0 | 20.0 | 140.0 | 5.0 | 5.0 | 80,960.0 | 40,050.0 | 40,910.0 |
| Age 65 – 74 | 30.0 | 10.0 | 15.0 | 15.0 | 0 | 5.0 | 75,980.0 | 35,940.0 | 40,040.0 |
| Age 75 and over | 10.0 | 10.0 | 5.0 | 0 | 0 | 0 | 69,635.0 | 27,595.0 | 42,035.0 |
| Average age of the population | 20.3 | 20.4 | 20.2 | 0 | 19.3 | 18.9 | 35.7 | 34.6 | 36.7 |
| % of the population ages 15 and over | 51.9 | 53.4 | 50.3 | 19.1 | 53.3 | 54.5 | 76.9 | 76.0 | 77.7 |

(Statistics Canada, 1996)

# APPENDIX D

## Language Characteristics for Pelican Narrows, Saskatchewan

| Characteristics | Indian Reserve | | | Village | | | Saskatchewan | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| Total – Language (s) first learned and still understood – All persons | 1,405.0 | 720.0 | 685.0 | 445.0 | 220.0 | 220.0 | 976,615.0 | 483,805.0 | 492,810.0 |
| Aboriginal language (s) | 1.355.0 | 690.0 | 670.0 | 390.0 | 190.0 | 200.0 | 34,320.0 | 16,830.0 | 17,490.0 |
| French | 0 | 0 | 0 | 0 | 0 | 0 | 19,075.0 | 9,295.0 | 9,785.0 |
| English | 45.0 | 30.0 | 15.0 | 55.0 | 35.0 | 20.0 | 816,955.0 | 407,265.0 | 409,685.0 |
| Other language(s) | 0 | 0 | 0 | 0 | 0 | 0 | 106,265.0 | 50,415.0 | 55,845.0 |
| % of population with Aboriginal language (s) first learned and still understood | 96.4 | 95.8 | 97.8 | 87.6 | 86.4 | 90.9 | 3.5.0 | 3.5.0 | 3.5 |
| % of population with Aboriginal language (s) spoken at home | 95.4 | 94.4 | 95.6 | 80.9 | 84.1 | 81.8 | 2.5.0 | 2.5.0 | 2.4 |
| % of population with knowledge of Aboriginal language (s) | 97.1 | 96.5 | 97.8 | 87.6 | 86.7 | 90.9 | 4.1 | 4.0 | 4.1 |

(Statistics Canada, 1996)

# APPENDIX E

Families and Dwellings Statistics for Pelican Narrows, Saskatchewan

| Characteristics | Indian Reserve | Village | Saskatchewan |
|---|---|---|---|
| **Selected family characteristics** | | | |
| Number of married or common-law families | 205.0 | 65.0 | 225,455.0 |
| Average number of persons of persons in husband-wife or common-law families | 5.1 | 4.6 | 3.2 |
| Average total income of husband – wife or common – law families $ | 28,578.0 | 31,905.0 | 53,109.0 |
| Number of lone-parent families | 40.0 | 20.0 | 34,925.0 |
| Average number of persons in lone parent families | 3.9 | 2.8 | 2.7 |
| Average total income of lone-parent families $ | 17,687.0 | 14,373.0 | 26,073.0 |
| **Selected dwelling characteristics** | | | |
| Total – Number of private occupied dwellings | 260.0 | 95.0 | 372,820.0 |
| Dwellings constructed before 1981 | 80.0 | 55.0 | 291,440.0 |
| Dwellings constructed between 1981 and 1996 | 175.0 | 40.0 | 81,380.0 |
| Dwellings requiring regular maintenance only | 110.0 | 40.0 | 223,745.0 |
| Dwellings requiring minor repairs only | 90.0 | 25.0 | 115,010.0 |
| Dwellings requiring major repairs | 60.0 | 25.0 | 34,060.0 |
| % of occupied dwellings with more than one person per room | 42.3 | 31.5 | 1.6 |

(Statistics Canada, 1996)

# APPENDIX F

## Education Statistics for Pelican Narrows, Saskatchewan

| Characteristics | Indian Reserve | | | Village | | | Saskatchewan | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| **Highest level of schooling for the population age 15 and over** | | | | | | | | | |
| Total – All persons age 15 and over | 730.0 | 380.0 | 345.0 | 240.0 | 120.0 | 125.0 | 748,130.0 | 366,735.0 | 381,400.0 |
| Persons without a high school certificate | 560.0 | 290.0 | 265.0 | 145.0 | 75.0 | 70.0 | 322,390.0 | 165,450.0 | 156,945.0 |
| Persons with a high school certificate | 25.0 | 10.0 | 15.0 | 15.0 | 0 | 10.0 | 79,555.0 | 38,205.0 | 41,350.0 |
| Persons with some post secondary education (post secondary not completed) | 25.0 | 10.0 | 10.0 | 20.0 | 10.0 | 15.0 | 80,950.0 | 37,980.0 | 42,970.0 |
| Persons with trades or non-university certificate or diploma | 95.0 | 55.0 | 40.0 | 40.0 | 20.0 | 20.0 | 169,830.0 | 80,120.0 | 89,710.0 |
| Persons who have completed university | 25.0 | 10.0 | 20.0 | 15.0 | 10.0 | 0 | 95,405.0 | 44,975.0 | 50,430.0 |
| **Highest level of schooling for the population age 25 and over** | | | | | | | | | |
| % of the population 25 years of age and over with less than grade nine | 53.2 | 52.1 | 54.3 | 32.3 | 37.5 | 33.3 | 15.4 | 16.6 | 14.2 |
| % of the population 25 years of age and over with a high school certificate or higher | 30.9 | 31.3 | 28.3 | 48.4 | 43.8 | 53.3 | 59.2 | 57.6 | 60.8 |
| % of the population 25 years of age and over with trades or non-university certificate or diploma or higher | 24.5 | 25.0 | 21.7 | 32.3 | 37.5 | 33.3 | 40.2 | 39.3 | 41.0 |
| % of the population 25 years of age and over who have completed university | 5.3 | 4.2 | 6.5 | 6.5 | 12.5 | 13.3 | 15.5 | 14.3 | 14.8 |

(Statistics Canada, 1996)

# APPENDIX G

## Income and Work Statistics for Pelican Narrows, Saskatchewan

| Characteristics | Indian Reserve | | | Village | | | Saskatchewan | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| **Labor force characteristics of the population age** | | | | | | | | | |
| Average total income of persons reporting income $ | 10,883.0 | 11,577.0 | 10,125.0 | 12,448.0 | 15,704.0 | 9,218.0 | 22,541.0 | 28,103.0 | 17,002.0 |
| Persons in the employed labour force | 175.0 | 95.0 | 80.0 | 80.0 | 45.0 | 35.0 | 467,290.0 | 254,450.0 | 212,835.0 |
| 1996 unemployment rate | 33.3 | 39.4 | 19.0 | 28.6 | 30.8 | 25.0 | 7.2.0 | 7.4 | 7.0 |
| 1996 participation rate | 37.0 | 42.9 | 30.0 | 43.8 | 54.2 | 32.0 | 67.3 | 74.9 | 60.0 |
| **Industry characteristics of the population age 15 and over who have worked since January 1, 1995** | | | | | | | | | |
| Total – All industries | 250.0 | 150.0 | 95.0 | 95.0 | 55.0 | 35.0 | 493,430.0 | 269,810.0 | 223,625.0 |
| Persons in agriculture and other resources – based industries (primary) | 40.0 | 40.0 | 0 | 10.0 | 10.0 | 0 | 92,600.0 | 68,945.0 | 23,650.0 |
| Persons in manufacturing and construction industries (secondary) | 35.0 | 35.0 | 0 | 10.0 | 10.0 | 0 | 55,705.0 | 45,955.0 | 9,745.0 |
| Persons in service industries (tertiary) | 170.0 | 75.0 | 95.0 | 80.0 | 40.0 | 35.0 | 345,130.0 | 154,900.0 | 190,225.0 |

(Statistics Canada, 1996)

# APPENDIX H

## Chart Review Tool

**Age:**

**Gender:**
1. Male
2. Female

**Status:**
1. Treaty
2. Non-treaty

**ID #:**

| # VISIT | HC Provider | Diagnostic Tests Ordered | Diagnosis | Antibiotic Treatment | Follow Up Suggested |
|---|---|---|---|---|---|
| | 1. NP<br>2. PCP | 1. X-Ray<br>2. TBN<br>3. Serology<br>4. Swab (culture)<br>5. Sputum (AFB, culture)<br>6. Peak flow<br>7. NP swab<br>8. Other | 1. OM<br>2. Skin Infection<br>3. URTI<br>4. Pharyngitis / Throat<br>5. Gastric Infection<br>6. Other | 1. Amoxil<br>2. Septra<br>3. Keflex<br>4. Cloxacillin<br>5. Erythromycin<br>6. Pen V<br>7. Clavulin<br>8. Ceclor<br>9. Topical solution<br>10. Otic solution<br>11. Nitrat<br>12. Other | 1. Yes<br>2. No |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |

# APPENDIX I

## Letter to PBCN Requesting Research Approval

November 23, 1999

Jean Ahenakew
Peter Ballantyne Cree Nation Health Services Inc.
Opawikoscikan Reserve # 201 Box 339
Prince Albert, SK
S6V 5R7

Dear Jean,

As you know I am interested in doing research in the Pelican Narrows Health Center to complete the requirements of my Masters Degree in Nursing through the University of Alberta. I am writing this letter to begin discussions on my thoughts regarding my thesis research.

The study that I am considering would focus on a comparison of nurse practitioners and physicians related to the accepted treatment guidelines for infectious disease in the pediatric population. The study would involve a chart review of pediatric ambulatory patients aged one to five who have visited the Pelican Narrows Health Center between July 1,1999 and December 31, 1999. I would be looking at all visits pertaining to the diagnosis and management of infectious disease such as otitis media, respiratory tract infections, skin infections and gastroenteritis. It is not my aim to look at patient satisfaction with caregivers nor will I be trying to establish superiority of nurse practitioners versus physicians. This study would involve only "grouped" data, with no individuals, per se, identified. This study would not involve any direct contact with patients.

I am currently working on a comprehensive literature review where I have discovered that several studies have been done comparing the management of various aspects of primary care between nurse practitioners and physicians. However, a study comparing and contrasting the management and diagnosis of infectious disease in Northern Saskatchewan has not been done. I am proposing such a study to take place in the Pelican Narrows Health Center.

This study would be of direct benefit to you as a means of a clinical audit conducted on current practices in Pelican Narrows. Furthermore, it has been argued in the literature that 40-90% of primary care can be delegated to nurse practitioners. Findings from this study may further support the role of a more independent nursing practice in Pelican Narrows.

I conceivably could start the data collection process as early as March 2000. I am also willing to be available for employment according to the same contract signed in April 1999. I would review the charts on my own time, evenings and weekends as appropriate.

I am requesting your input into this study. The proposal will subsequently be developed with the guidance of my Thesis Supervisory Committee and ultimately sent to you for your approval prior to submission to the Ethics Review Committee, Capital Health Region.

Please note that I am also forwarding this letter to Sally Laidlaw, Connie Piochion and Sara Whitehead for comments, as they are all familiar with this research request. Please do not hesitate to contact me if more information is needed before consideration can be given. Thank you in advance for your assistance.

Sincerely,

Jennifer Knopp RN, BScN, MN Student

508, 11135-83rd Ave
Edmonton, AB
T6G 2C6
780-433-4231
jknopp@ualberta.ca

Cc: Sally Laidlaw, Connie Piochion, Dr. Sara Whitehead,
Dr. Louise Jensen (Thesis Supervisor)

# APPENDIX J

## Letter from PBCN Granting Research Approval

**PETER BALLANTYNE CREE NATION**
**HEALTH SERVICES INC.**
Opawikoscikan Reserve #201
Box 339
. Prince Albert, SK, S6V 5R7
Ph. (306) 953-4425 Fax (306) 922-4979

January 10, 2000

Jennifer Knopp
508-11135 83rd Avenue
Edmonton AB T6G 2C6

Dear Jennifer:

The request for your research project was discussed at the December Board Meeting. It was decided that permission be granted for the research as outlined in your letter of November 23, 1999. We look forward to reviewing the results of your research.

Sincerely,

Jean Ahenakew
Director of Nursing Services
PBCN Health Services Inc.